Management of Lower Respiratory Tract Infections at Residential Aged Care Facilities by Mobile Assessment and Treatment Service

Is this is the future?

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Introduction

LRTIs are very common in RACFs - Lim et al, 2012

LRTIs are associated with significant mortality - Muder, 1998

Management of moderate to severe infection requires hospital admission

Hospitalization of frail older person is associated with high incidence of adverse events - Friedman et al, 2008

Hospitalization associated with significant economic cost - Dosa, 2005

LRTI = Lower Respiratory Tract Infections, RACF = Residential Aged Care Facilities
Alternative

Able to provide oxygen therapy

Able to administer IV antibiotics

Able to provide fluid replacement

After hours triage service

Physician availability for assessment onsite

Access to diagnostic testing

Barriers to treating LRTIs at the facility
Mobile Assessment and Treatment Service (MATS)

- In Reach program developed by Alfred Health
- Provides medical and nursing care to older people in the community
- 24 hour telephone service – after hours triage advice
- Physician site assessments available between 8am and 8pm weekdays and 10am and 6pm weekends
- MATS is able to provide Intravenous antibiotic therapy, subcutaneous fluid therapy
- Access to Alfred Health pathology service
Several North American studies reported **no significant** differences in 30 day mortality between hospital treatment vs treatment at nursing homes 1-4

- Characteristics of Long Term Care Facilities (LTCF) in North America different to Australian RACFs

- No local studies evaluating treatment of LRTI at hospital vs RACFs

2. Kruse et al, Medical care 2004;42:860
4. Loeb et al, JAMA 2006;295:2503
Objectives

Research Question:
How does MATS management of LRTI compare to hospital management?

Aims:
To evaluate the 30 day mortality following MATS treatment of LRTI compared to hospital treatment among RACF residents

Ethics approval was obtained from Alfred Health Ethics Committee in Oct 2012
Project No 490 / 12
METHODS
Pilot observational study conducted at Alfred Health, VIC between Dec 2012 and Dec 2013

**GROUPS**

*Inclusions:*
- Age > 65 yrs
- RACF residence
- LRTI diagnosis

**Hospital**

*Exclusions:*
- Terminal respiratory failure
- Transferred to other hospital
- Required treatments MATS unable to provide
- Hospital Acquired Pneumonia

**MATS**

*Exclusions:*
- Terminal respiratory failure
- MATS unable to treat at facility
Definitions and Diagnostic Criteria

Lower Respiratory Tract Infections

As defined by 1991 McGeer’s Criteria

McGeer et al, 1991

Requires 3 out of 6 clinical signs or symptoms

1. New or increased Cough
2. New or increased Sputum Production
3. Fever > 38 ⁰C
4. Pleuritic Chest Pains
5. New Auscultatory Findings
6. New or increased Dyspnoea / Tachypnoea / Acutely Altered Mental State

Chest imaging not required
Outcome Measures

**Primary Outcome**
- 30 day mortality

**Secondary Outcome**
- Antibiotic usage (type, duration, route)
- Complications rates (falls, diarrhoea, pressure injury)
- Describe patterns of advanced care planning among RACF residents treated by MATS
Procedure

MATS group:
1. Referral received from RACF
2. MATS team reviews patient
   • Data collected prospectively
   • Treatment initiated
3. 30 day mortality data:
   • routine follow up phone call made by MATS nurse

Hospital Group:
1. ED diagnosis suggestive of LRTI selected
2. Electronic medical records reviewed for data collection
3. 30 day mortality data:
   • Facilities contacted to collect mortality data
   • Where available data also collected from electronic medical records
Data Collected

**Baseline Characteristics**
- ED diagnosis, Referrer, Level of Care, For acute transfer, Age, Gender, Time of referral, Advanced Care Plans for MATS group

**Co Morbidities**
- Malignancy, Liver Disease, Heart Failure, Airways Disease, Cerebrovascular Disease, Renal Disease, Dementia, Diabetes, Depression, Alcohol use, Smoking

**Investigations & Antibiotics**
- Full Blood Count, Electrolytes, C Reactive protein, albumin, Glucose

**Vital Signs & Examination Findings**

**Complications & 30 day mortality**
- Falls, Diarrhoea, Pressure Injury

**Subsequent re-referrals**
Statistics

• Continuous variables:
  – Student T-test
  – Mann Whitney U test (if not normally distributed)

• Categorical Data:
  – Pearson Chi Squared test
RESULTS
## Demographics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total (n=92)</th>
<th>Hospital (n=37)</th>
<th>MATS (n=55)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male, %</td>
<td>51.1</td>
<td>51.4</td>
<td>50.9</td>
<td>0.967</td>
</tr>
<tr>
<td>Age, yrs</td>
<td>Median (IQR)</td>
<td>86 (82–92)</td>
<td>88 (82-92)</td>
<td>86 (80-91)</td>
</tr>
<tr>
<td>Level of care, %</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>65.9</td>
<td>37.8</td>
<td>85.2</td>
<td>0.001*</td>
</tr>
<tr>
<td>Co-existing Diseases, %</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cardiac Failure</td>
<td>51.1</td>
<td>70.3</td>
<td>38.2</td>
<td>0.003*</td>
</tr>
<tr>
<td>COPD</td>
<td>50.0</td>
<td>54.1</td>
<td>47.3</td>
<td>0.524</td>
</tr>
<tr>
<td>Dementia</td>
<td>46.7</td>
<td>45.9</td>
<td>47.3</td>
<td>0.900</td>
</tr>
</tbody>
</table>

COPD = Chronic Obstructive Pulmonary Disease
* Significant P value < 0.05
### Clinical Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Hospital (n= 37)</th>
<th>MATS (n=55)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory Rate (median)</td>
<td>24 (20-28)</td>
<td>21(20-28)</td>
<td>0.277</td>
</tr>
<tr>
<td>Systolic Blood Pressure (median, mmHg)</td>
<td>130 (110-144)</td>
<td>120 (110-140)</td>
<td>0.477</td>
</tr>
<tr>
<td>Temperature (median, °C)</td>
<td>37.6 (37.0-38.3)</td>
<td>37.0 (36.7 – 37.4)</td>
<td>0.018*</td>
</tr>
<tr>
<td>Heart Rate (median, bpm)</td>
<td>84 (76-95)</td>
<td>85 (80-98)</td>
<td>0.502</td>
</tr>
<tr>
<td>Room Air Oxygen Saturations (median, %)</td>
<td>90 (86-94)</td>
<td>91 (87-94)</td>
<td>0.941</td>
</tr>
<tr>
<td>Acutely Altered Mental State, %</td>
<td>27.0</td>
<td>49.1</td>
<td>0.034*</td>
</tr>
</tbody>
</table>

* Significant P value < 0.05
16 participants died at 30 days

Primary Outcome: 30 day mortality comparison

MATS (n =55)  Hospital (N=37)

12/55  4/37

P = 0.172
30 day mortality

16 participants died at 30 days – 14 from HLC and 2 from LLC

Mortality among participants from HLC

<table>
<thead>
<tr>
<th>Location</th>
<th>Mortality Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATS</td>
<td>11/47 (23%)</td>
</tr>
<tr>
<td>Hospital</td>
<td>3/14 (21%)</td>
</tr>
</tbody>
</table>

P = 0.88
Secondary Outcomes

Ceftriaxone was the most common antibiotic used in both groups

Duration of admission and IV antibiotic therapy

- Duration of Admission: 7.3 (MATS) vs. 7.2 (Hospital)
- Duration of IV Antibiotic Therapy: 4.1 (MATS) vs. 3.5 (Hospital)
## Complications

<table>
<thead>
<tr>
<th>Complication</th>
<th>Hospital (n= 37)</th>
<th>MATS (n=55)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure Injury, %</td>
<td>5.4</td>
<td>1.8</td>
<td>0.342</td>
</tr>
<tr>
<td>Falls, %</td>
<td>2.7</td>
<td>5.5</td>
<td>0.526</td>
</tr>
<tr>
<td>Diarrhoea, %</td>
<td>2.7</td>
<td>1.8</td>
<td>0.775</td>
</tr>
</tbody>
</table>
Advanced Care Planning

**To Transfer Or Not To Transfer?**

- 54.5% (30/55) did **not** wish to be transferred
- 45.5% (25/55) wished to be transferred

- 93.3% were from HLC

MATS group n = 55

- None were transferred
- 8% (2/25) were eventually transferred
DISCUSSION
Summary

• First Australian study to review 30 day mortality outcomes of managing LRTI within RACFs

• 30 day mortality reported in this study comparable to previously reported mortality post LRTI

  – Hospital treatment mortality: 9 - 24.7%,
  – Facility treatment mortality: 8 - 24.1%

2. Kruse et al, Medical care 2004;42:860
4. Loeb et al, JAMA 2006;295:2503
Summary

• Significant differences in clinical characteristics of participants in both groups

  – MATS participants more likely:
    • to be from high level care
    • have altered mental state at presentation

• We have not detected statistically significant difference in 30 day mortality outcomes between treatment groups
Limitations

• Observational study
  – MATS data collected prospectively
  – Hospital data collected via chart audit retrospectively

• Not possible to accurately account for whether MATS would have definitely been able to treat patients who presented to ED

• Not all RACF residents treated for LRTI in hospital may have been included
Limitations

• 30 day mortality
  – Underpowered to detect statistically significant differences
    • 11% difference in mortality between groups
  – Differences in clinical characteristics between groups
    • Both High and Low level care residents included
    • Did not account for functional status of participants
Conclusion

• Currently MATS provides an alternative to management of LRTI in hospital for some frail, older people living in RACFs

• MATS is capable of reducing hospital admission for LRTI by providing specialist care safely onsite

• Mortality may not be most important outcome
  – functional outcomes and QOL measures maybe more meaningful in this population group
Acknowledgements

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• Dr Louise Dillon